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THEORIES OF DECISION MAKING:
AN ANNOTATED BIBLIOGRAPHY

Deborah Lines Andersen
David F. Andersen

WP 943-77

June 1977

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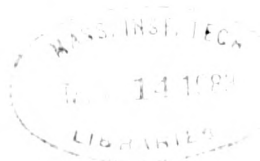
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INTRODUCTION

BACKGROUND AND SCOPE

Much literature has been written on the subject of decision making. At various times bibliographers have sought to collect this information in a usable form. In 1958 Paul Wasserman and Fred S. Silander published an annotated bibliography on decision making. They felt that "in spite of an increasing rate of publication on the topic, the scientific study of decision-making appears to be at an early stage of development.... The literature's sum total is to be found in a widely scattered group of writings which cut across all the areas of social and scientific inquiry."¹ Their bibliography is divided into eight sections which deal with various factors in decision making and with the types of groups who make decisions.²


In 1959 William J. Gore and Fred S. Silander published "A Bibliographic Essay on Decision Making."³ Gore and Silander saw decision making as a fractured and conceptually incomplete body of literature, "a kind of conceptual wonderland full of magnificently intricate and promising devices but without any central or organizing concept."⁴ They set about to apply an organizing principle to the literature of decision making, dividing it into the behavioristic or organismic thread and the rationalistic thread. The organismic thread was subdivided into three additional areas. Their self-appointed task was to give structure to the chaos, since "critical

¹Paul Wasserman and Fred S. Silander. Decision Making: An Annotated Bibliography. Cornell University: Graduate School of Business and Public Administration, 1958, p. iv.

²Note: These headings, an indication of the structure of the literature at the time, consist of: I. The decision-making process--general and theoretical material, II. Values and ethical considerations in decision-making, III. Leadership as a factor in decision-making, IV. Psychological factors in decision-making, V. Decision-making in small groups, VI. Community decision-making, VII. Communications and information handling, and VIII. Mathematics and statistics in decision-making.

³William J. Gore and Fred S. Silander. "A Bibliographic Essay on Decision Making." Administrative Science Quarterly 4 (1959), pp. 97-121.

⁴Ibid., p. 98.



[REDACTED]

factors such as topology of decisions, models of various decisional processes, the function of ideology, and the basis of power and its generation receive only infrequent and inadequate attention."¹

In 1964 Paul Wasserman and Fred S. Silander updated their Decision Making: An Annotated Bibliography, producing a 178 page supplement to the original work, although "since many more citations can be found for the period 1958 to 1963 than for the earlier period, the present work is considerably more selective."² The bibliography uses the same basic structure as the original volume, although "modifications in this topical arrangement from the earlier work reflect the differences growing out of the more recent directions of research and subsequent publication in the field."³

Most recently, R. Bandyopadhyay has published an article, "information for Organizational Decisionmaking--A Literature Review."⁴ A bibliographic essay, the article divides the literature of organizational decision making into three areas: the classical school, the management science school and the behavioral science school. Underlining what those before him

¹Ibid., p. 121.

²Paul Wasserman and Fred S. Silander. Decision-Making: An Annotated Bibliography, Supplement, 1958-1963. Cornell University: Graduate School of Business and Public Administration, 1964, p. iii.

³Ibid. Note: Comparison with the earlier headings shows that there had been a change in the direction of the literature as seen by Wasserman and Silander. Their 1964 headings read as follows: I. Decision making--general and theoretical material, II. Leadership as a factor in decision making, III. Behavioral decision theory, IV. Decision making in small groups, V. Community decision making, VI. Communications and information handling, VII. Techniques and methods, and VIII. Cases, illustrations and applications. The most notable changes are the change from psychological factors to behavioral theory and the change from mathematics and statistics to actual cases and applications. The categories appear more clear cut and reflect the increased research in the field.

⁴R. Bandyopadhyay. "Information for Organizational Decisionmaking--A Literature Review." IEEE Transactions on Systems, Man, and Cybernetics 7 (January 1977) pp. 1-15.

have pointed out, the author states in his first paragraph that "literature on information relevant for organizational decision making is scattered over a wide variety of books and journals. The literature is not only voluminous but is also extremely varied, making comprehensive review a very difficult task."¹ Thus, the area of decision making still seems wide open for bibliographers as well as researchers to organize and attempt to make sense of.

STRUCTURE OF THE LITERATURE

Historically, the field of decision making has gone through several stages. These stages can be characterized as 1) preoccupation with the rational, 2) critiques and extensions of the rational tradition, 3) creation of fully articulated alternatives to the rational and, finally, 4) a multi-perspective view of decision making. In the early 1950s the decision making literature was preoccupied with rationality--either in the form of a political "single-actor" rational organization or as a rational economic man. This view saw that "decision is a deliberate act of selection by the mind, of an alternative from a set of competing alternatives in the hope, expectation or belief that the actions envisioned in carrying out the selected alternative will accomplish certain goals."² The decision maker was seen as having the capability of looking at all possible choices and outcomes, weighing each, and then making an optimal decision based upon these deliberations.

Critiques and extensions of the rational tradition began to appear in the next phase of decision making literature as scholars realized that neither man nor his organizations were capable of making decisions which took into account all possible alternatives, assessed all possible outcomes, and selected the optimal among such alternatives. Herbert A. Simon, for example, in Models of Man: Social and Rational, collected his essays which were "concerned with laying foundations for a science of man that

¹Bandyopadhyay, op. cit., p. 1.

²Peter C. Fishburn. "Personalistic Decision Theory: Exposition and Critique" in Henry S. Brinkers, ed. Decision-Making: Creativity, Judgment and Systems. Columbus: Ohio State University Press, 1972, p. 19.

will accommodate comfortably his dual nature as a social and as a rational animal."¹ He aimed to "set forth a consistent body of theory of the rational and nonrational aspects of human behavior in a social setting."² Although not totally rejecting the rational point of view, he extended his ideas to include man as a social as well as a rational being.

In the next stage of decision making literature, there was the preliminary articulation of full-fledged alternative views to the classical rational tradition. Some of the extensions of rational theory had moved so far away from the original concept of rationality that they could no longer be considered modifications--they were entirely new views. Richard Cyert and James March, for example, introduced an organizational theory of decision making in A Behavioral Theory of the Firm that was to replace the neo-classical economic theory of the firm.³ Synder, Bruck and Sapin posited an alternative political science theory of international decision making in Foreign Policy Decision Making: An Approach to the Study of International Politics.⁴ The rational theory was either totally put aside in favor of these other views, or modified so substantially as to no longer be a purely rational view. Several decidedly non-rational views of the decision making process grew out of the literature of cognitive and perceptual psychology.⁵

¹Herbert A. Simon. Models of Man: Social and Rational, Mathematical Essays on Rational Human Behavior in a Social Setting. New York: John Wiley and Sons, Inc., 1957, p. vii.

²Ibid.

³Richard M. Cyert and James G. March. A Behavioral Theory of the Firm. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963.

⁴Richard C. Snyder, H.W. Bruck and Burton Sapin, eds. Foreign Policy Decision-Making: An Approach to the Study of International Politics. New York: Free Press of Glencoe, 1962.

⁵See: Robert Jervis. Perception and Misperception in International Politics. Princeton, N.J.: Princeton University Press, 1976.

As these alternate views of the decision making process began to emerge several attempts were made to integrate them. Finding a sense of fragmentation in multiple theories of decision making, scholars wished to reunite the field. One method of doing just this was to produce a reader which brought together articles of various schools of theory.¹ Another method was to create a review article which would survey the field, showing the various theories which were in the literature.² Finally, other writers produced monographs which attempted to produce an integrated whole. However, these works appeared to promote integration more by a unified writing style emphasizing some points of tangency rather than by a genuine unification of the multiple perspectives.³

Finally, in 1969 Graham T. Allison articulated a multiple perspective approach to the study of decision making. It seemed too premature to bring all the ideas together; instead each of the competing schools of thought should be more thoroughly examined in its own right. More time had to be spent looking at each of the theories and their assumptions. The various theories needed to be empirically tested on the same case to see exactly what differences were implied by each of the separate perspectives. He proffered the idea that "different analysts, relying predominantly on different models, produce quite different explanations which should encourage the analyst's self-consciousness about the nets he employs."⁴ In other words, there is not one theory, the theory, but decision making is multi-dimensional and the analyst needs multiple lenses, or points of view, in order to better understand the many complexly intertwined dimensions of the decision making process.

¹See: Marcus Alexis and Charles Z. Wilson, eds. Organizational Decision Making. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967.

²See: Martin Shubik. "Approaches to the Study of Decision Making Relevant to the Firm." Journal of Business 34 (April 1961) pp. 101-118.

³See: Ronald J. Ebert and Terence R. Mitchell. Organizational Decision Processes: Concepts and Analysis. New York: Crane, Russak, 1975.

⁴Graham T. Allison. "Conceptual Models and the Cuban Missile Crisis." Political Science Review 63 (September 1969) p. 715.

In 1971 Allison made an explicit elaboration of the multiple perspectives idea in The Essence of Decision: Explaining the Cuban Missile Crisis.¹ The notion of explicit and contrasting theories or models of decision making began to receive attention in several fields of inquiry. John D. Steinbruner in The Cybernetic Theory of Decision also employed and elaborated upon this multiple perspective idea.²

A final dimension of complexity cutting across all of the four stages outlined above was the appearance of a mushrooming collection of technical works in the form of mathematical game theory, statistical decision theory and computer based decision aids, such as management information systems, and mathematical programming and simulation. The use of the computer and other mathematical techniques was applied to decision analyses of many theoretical persuasions in order to allow more explicit formulations of decision making models. All modern schools of thought concerning decision making have at least one mathematical component. However, it is safe to say that mathematical formulations tend to lean toward the normative and the rational.

The existing bibliographies and bibliographic essays on decision making, as noted above, approach many facets of the subject from small group to community decision making, to decision making within organizations. None specifically concentrates on the explicit articulation of multiple theories or models of decision making that may be more or less valid simultaneously. This bibliography attempts to bring together some of the major divergent views to foster cross-disciplinary multiple views of decision making. That is, the view fostered by this new line of research is that decision making is intrinsically characterized by multiple perspectives.

¹Graham T. Allison. The Essence of Decision: Explaining the Cuban Missile Crisis. Boston: Little, Brown and Company, 1971.

²John D. Steinbruner. The Cybernetic Theory of Decision: New Dimensions of Political Analysis. Princeton, N.J.: Princeton University Press, 1974.

PURPOSE

There is an apparent need for a paper structuring the field of decision making. The authors of this particular paper have taken a look at a segment of the material available on decision making. The bibliography is both selective and restricted to the material available at the Dewey Library of the Massachusetts Institute of Technology. Since the materials here are specifically those found within M.I.T.'s Dewey Library, the greatest use will be to those students who work within the Sloan School. It is clear to the authors that this paper is an initial attempt at structuring the field along the lines of simultaneous multiple theories and that research in the field will be a continuing effort.

METHODOLOGY

The initial research for this work started with a primary reference search. It was felt by the authors that five books presently structured the field.¹ Other possible sources were discussed and it was decided that the search would be restricted to Dewey Library, to literature published between 1957 and 1976 (one year before Wasserman's Supplement to the present) and to generally published pieces of writing. (Thus, working papers and dissertations are not included here.)

¹Note: these five works were: Cyert and March. A Behavioral Theory of the Firm. 1963; Allison. The Essence of Decision. 1971; Steinbruner. The Cybernetic Theory of Decision. 1974; Braybrooke and Lindblom. A Strategy of Decision: Policy Evaluation as a Social Process. 1970; and Axelrod. Structure of Decision: The Cognitive Maps of Political Elites. 1976.

These initial five works and their bibliographies, in particular, produced not only a list of pertinent journal articles and monographs but also a list of those journals and authors who have concentrated on various views of decision making.¹ The next step in the search was to search the Dewey card catalogue for materials pertinent to decision making (although there is no specific heading for "theories of") and works by these authors who appeared to be at the center of the field. In each case, as a citation was taken down and as an annotation for the particular book or article made, the bibliography of each piece of literature was searched for new material. After considerable searching the same citations began to reappear in bibliographies, indicating that some amount of closure was being obtained within the topic. It became apparent that many authors were relying upon a core of literature, and indeed much of it was related to that original list of authors.

Journals were searched in several ways. There were some that apparently had much information on decision making, considering the frequency with which their articles were cited elsewhere. These journals' indexes were searched, 1957 to present, to gather more information. The following indexing and abstracting services were also consulted to allow for articles that had not been cited elsewhere:

Business Periodicals Index
Social Science Citation Index
Sociological Abstracts
Sociology Readers Index (Abramson and Sofios; 2 volumes)

Again, as with the monographs, each article's bibliography was consulted to gather up additional information.²

Finally, several members of the M.I.T. community were consulted who are involved in similar research (decision making, theories and models). They were able to provide bibliographies from unpublished working papers and from their own knowledge of the structure and literature of the field.

The result of this research is a selected, annotated bibliography which structures the field of decision making along the lines of various

¹Note: The authors are those listed on page 7 and Herbert A. Simon who was cited often in the literature. The journals consisted of: Administrative Science Quarterly; Interfaces; Policy Sciences and Theory and Decision.

²All references given in the following bibliography have been examined by this author.

theories which have arisen concerning how individuals, groups, and organizations make decisions. In many instances it was difficult to tell specifically into which category a particular article or book fit--as has been noted, the literature is not segmented into neatly defined categories. Although this bibliography does not claim to be comprehensive, it is an attempt at structuring decision making literature along lines that have not been used before but that have been implied if not suggested by major researchers in the field.

STRUCTURE OF THE BIBLIOGRAPHY

As a final note, the literature in this bibliography is organized by discipline. After that it is organized by the overlap between disciplines. And finally it is organized by the mathematical models of decision making since mathematics appears to cut across all disciplines.

The literature is nonetheless indistinct in that it does overlap so much between disciplines. Therefore, the bibliography attempts to reflect this indistinct nature of the literature by doing much cross referencing. Each reference has been housed in one category and then cited again in others where it also seems to belong. These secondary citations have been abbreviated to cut down on the bulk of the work, using only author(s), an abbreviated title, date, and a note as to the section where the full citation and annotation can be found. This author felt that abbreviated secondary citations were preferable to complete reiterations of the reference for each source. The bibliography is more honest in that the actual number of distinct references is more apparent when second and subsequent citings are abbreviated.¹

¹There are 91 annotations here but 138 citations total; thus an overlap of 47 cross references reflecting the multi disciplinary nature of the literature.

BIBLIOGRAPHY

I. RATIONAL DECISION MAKING (ECONOMIC MAN)

I.A. NORMATIVE RATIONALITY

Allison, Graham T. The Essence of Decision. 1971. (See Section V.C.)

Fishburn, Peter C. "Personalistic Decision Theory: Exposition and Critique" in Brinkers, Henry S., ed. Decision Making: Creativity Judgement and Systems. Columbus: Ohio State University Press, 1972, pp. 19-41.
A personalistic decision theory is defined wherein an individual searches out all available alternatives, assesses individual preferences and expected utilities, and only then arrives at a decision.

Friedrich, Carl J., ed. Rational Decision. New York: Atherton Press, 1964, 228 pp.
A collection of articles from the annual meeting (1962) of the American Society for Political and Legal Philosophy is presented. The volume "presents the student of philosophical politics with the vast and inexhaustable problem of rationality in its relation to decision-making."

Kassouf, Sheen T. Normative Decision Making. Englewood Cliffs, N.J.: Prentice-Hall Inc., 1970, 88pp.
"This volume is aimed at providing a clear and concise introduction to modern ways of conceptualizing the decision-making process." The work is not intended to produce specialists, but rather to acquaint the reader with the fundamental principles of decision making under uncertainty.

Kaufmann, Arnold. The Science of Decision Making: An Introduction to Praxeology. New York: McGraw-Hill Book Company, 1968, 256 pp.
This work is a polemic promoting "praxeology" or the science of decisions for dealing with the complexities of the modern age. It forms a broad and popular introduction to probability, uncertain games, sequential decision processes, and simulation--not much depth is apparent anywhere.

Weber, Max. The Theory of Social and Economic Organizations. New York: The Free Press, 1964, 436 pp.
In a penetrating cross-cultural analysis of forms of social and economic organization, Weber posits rationality as a normative keystone to modern western culture. This early work (the cited work is a translation and republication) set the frame for much of the preoccupation with a rational and normative view of decision making

that was to occupy students of both economics and public administration until after the second world war. Alternative models of decision making initially emerged as critiques of normative Weberian rationality.

I.B. CRITIQUES AND EXTENSIONS OF RATIONALITY (See also II.B. Organizational Critiques and Extensions of Rationality and IV.B. Psychological Critiques of and Extensions to Rationality)

Baumol, William J. and Quandt, Richard E. "Rules of Thumb and Optimally Imperfect Decisions." American Economic Review 54 (March 1964) pp. 23-46.

Baumol and Quandt attempt to modify the normative optimizing model of pure rationality. Borrowing on Simon's notion of "satisficing" rather than optimizing, they argue that it is possible to evaluate rules of thumb to see which ones produce "optimally imperfect decisions." This measure of optimal imperfection takes into account the "cost" of gathering more information to make a more globally rational choice. The study is an exercise in extending a rational theory of decision to include cost of information and less-than-perfect rule of thumb decision algorithms. The authors conclude that "no serious recommendations can be offered to anyone who is responsible for pricing decisions in practice."

Friedrich, Carl J. Rational Decision. 1964. (See Section I.A.)

Lindblom, Charles E. "The Handling of Norms in Policy Analysis " in Abramovitz, Moses and others. The Allocation of Economic Resources. Stanford: Stanford University Press, 1959, 244 pp.

This essay is addressed to the question of how do economists handle norms or the evaluation of alternatives in their policy analyses. Three more specific sub-questions are asked: 1) How can non-commensurable outcomes be weighed in some fashion? 2) How can values be made operational enough so that an analyst may rank-order policy alternatives? and 3) How can economists arrive at agreement on value weighting and policy ranking schemes? Utility theory is examined and found wanting. Behaviorally, Lindblom argues that the total value problem is considerably simplified by many methods such as eliminating some values from consideration or only attempting to order a small set of incrementally different alternatives. The process of breaking apart the valuation process or "fragmentation" is suggested to be the mechanism that economists and analysts use to avoid the global valuation problem.

Shubik, Martin. "Approaches to the Study of Decision Making Relevant to the Firm." 1961. (See Section V.B.)

Simon, Herbert A. "A Behavioral Model of Rational Choice " in Models of Man: Social and Rational: Mathematical Essays on Rational Human Behavior

in a Social Setting. New York: John Wiley and Sons Inc., 1957.

A classic article. Simon begins with an elegant mathematical formulation of the globally rational decision process. This global process is simplified in three ways: 1) Simplified pay-off functions. 2) Partial ordering of pay-offs. 3) Inclusion of "cost" of information gathering. This rigorous modification of a globally rational model to make it more in line with human behavior is a precursor to Simon's notion of "satisficing" and Cyert and March's Behavioral Theory of the Firm. Simon's penetrating and mathematical probe into the bases of the rational theory lays the foundation for much of the behavioral theories that were to follow.

Simon, Herbert A. Models of Man. 1957. (See Section V.A.)

Simon, Herbert A. "Theories of Decision Making in Economics." American Economic Review 49 (June 1959) pp. 253-283.

Simon presents a critique of the classical "economic man." In slow moving markets characterized by low complexity, near-perfect competition, and information, the assumptions implicit in the value maximizing static economic model may make sense. However, in fast-moving complex markets, a more detailed elaboration of the behavior of rational man becomes necessary. Specifically, Simon examines 1) The applicability of utility functions. 2) Whether or not profit maximization is an adequate description of the goals of a firm. 3) Does "economic man" account fully for conflicts of interest, and 4) Has the value maximizing theory fully explained the process of expectation formation. Simon concludes that theories of rational man must become more behaviorally elaborated.

Tannenbaum, Robert. "Managerial Decision Making " in Porter, Donald E. and Applewhite, Phillip B., eds. Studies in Organizational Behavior and Management. Scranton, Pa.: International Textbooks, 1964, 741pp. Tannenbaum notes that analysts can not afford to stop at the rational theory since it is next to impossible to describe the mental processes which culminate in decisions. The necessity for making decisions arises out of the fact that knowledge of relevant existing facts is inadequate and that the future is uncertain--individuals can never have complete knowledge of all factors underlying their choices." Individual behavior is intrinsically non-rational.

Wendt, Dirk. "Some Criticism of Stochastic Models Generally Used in Decision Making Experiments." Theory and Decision 6 (May 1975) pp. 197-212. Wendt's criticism of such models is based upon the facts that they are: 1) Not appropriate in a variety of situations. 2) In all their consequences too complicated to be used by human subjects. 3) Composed of conditions that are hard to test and it is doubtful if they are ever met at all, and 4) Too strict for the prediction of human behavior. He points out areas where more research is needed.

I.C. MATHEMATICAL MODELS OF THE RATIONAL PERSPECTIVE

I.C.1 The "Systems" Approach

Benton, John B. Managing the Organizational Decision Process. Lexington, Mass.: Lexington Books, 1973, 271 pp.

This work examines "in theory and practice the keys to a successful organizational experience with the newer techniques of planning, analysis, and decision making." Chapter headings include: alternative program sets, program planning, preferred courses of action, and systems analysis.

Brauers, Wim K. Systems Analysis, Planning and Decision Models: With Special Reference to National Defense. Amsterdam: Elsevier Scientific Publishing Co., 1976, 167 pp.

The "cost-effectiveness paradigm for decision-making is presented. "The defense problem is approached as a system to which systems analysis is applicable and systems analysis is then defined as a tool to assist decision makers in making a choice by systematically examining and reexamining the relevant objectives of the system and of the alternative policies or strategies for attaining them."

Hitch, Charles J. Decision Making for Defense. Berkeley, California: University of California Press, 1965, 83 pp.

A series of four lectures on a systems approach to decision making in the defense environment is presented. The work provides an interesting introduction to the field, but little technical detail is provided. Topics include: 1) Defense posture 1789-1960. 2) Planning-programming-budgeting. 3) Cost effectiveness. 4) Retrospect and prospect.

Quade, E.S. Analysis for Military Decision. Chicago: Rand McNally and Company, 1964, 382 pp.

These seventeen essays are rewrites of lectures given at RAND in 1955 and 1959 summarizing the state of the art of "systems analysis" for military planning. The volume is not intended to teach operations research material, but rather give an appreciation for the techniques' strengths and limitations. The collection contains case studies as well as overviews of theory. The technical aspects of the material is somewhat dated.

I.C.2 Decision Theory

Archer, Stephen H. "The Structure of Management Decision Theory" in Rappaport, Alfred. Information for Decision Making: Quantitative and Behavioral Dimensions. Englewood-Cliffs N.J.: Prentice-Hall, Inc., 1970, pp. 3-19.

The work discusses varying degrees of information and how managers must deal with them. Emphasis is laid upon the notions of certainty, risk, and uncertainty. Problem areas for future study in decision theory are outlined.

Chernoff, H. "Rational Selection of Decision Function." Econometrica 22 (October 1964) pp. 422-443.

A highly normative procedure is derived for deducing how a rational analyst would properly choose a decision function. Rationality is defined in terms of nine postulates.

Fishburn, Peter C. "Even Chance Lotteries in Social Choice Theory." Theory and Decision 3 (October 1972) pp. 18-40.

A technically complex discussion of alternatives and preference in theory of social choice is presented.

Kassouf, Sheen T. Normative Decision Making. 1970. (See Section I.A.)

Pratt, John W., Raiffa, Howard and Schlaifer, Robert. Introduction to Statistical Decision Theory. New York: McGraw-Hill Book Company, 1965.

"This book is a Bayesian introduction to mathematical statistics, i.e., an introduction to the mathematical analysis of the problems which arise when the consequence of action depends on the uncertain 'state of the world' and the decision maker has obtained or can obtain additional information about the state of the world by sampling or experimentation." Calculus is required for this text.

Raiffa, Howard. Decision Analysis: Introductory Lectures on Choices Under Uncertainty. Reading, Mass.: Addison-Wesley Publishing Co., 1970, 309 pp.

A classic textbook on mathematical decision making under uncertainty. Topics include utility theory, decision trees, judgemental probabilities, risk sharing, and group decisions.

Taylor, Michael. "The Problem of Saliency in the Theory of Collective Decision-Making." Behavioral Science 15 (September 1970) pp. 415-430.

A model is developed of collective decision making by any voting body choosing among multi-attribute or multi-dimensional alternatives. Emphasis is upon the problem of saliency--preference ordering of alternatives.

White, D. J. Fundamentals of Decision Theory. New York: North-Holland, 1976, 387 pp.

This is a text treating the logical-mathematical aspects of decision for second and third year mathematically inclined economics students. Included are solutions to problems and references. Topics treated include: decision theory, probabilities, efficient solutions, game theory, group decision making, and value of information.

I.C.3 Simulation, Mathematical Programming, and M.I.S.

Berners-Lee, C.M., ed. Models for Decision. London: The English Universities Press Ltd., 1965, 149 pp.

This reader presents a range of mathematical models developed to support decision

making processes. The reader consists of a series of papers presented at a conference sponsored by the U.K. Automation Council. Four classes of models are presented--forecasting of demand, planning and production, manpower and organizational planning, and economic planning. This volume is more concerned with mathematics and less concerned with describing real decision-making processes in detail.

Feigenbaum, Edward A. and Feldman, Julian. Computers and Thought. 1963.
(See Section IV.E)

Forrester, Jay W. "Industrial Dynamics--A Major Breakthrough for Decision Makers." Harvard Business Review 36 (July-August 1958) pp. 37-66.
An early description by one of the founders of the field of how computer modeling could revolutionize managerial decision-making. Managers will have a "better ability to see where present company practices will lead" and will be able to "redesign [policy] so it stands a better chance of success."

Kaufmann, Arnold. The Science of Decision Making. 1968. (See Section I.A.)

Simon, Herbert A. Models of Man. 1957. (See Section V.A.)

Sprague, R.H. and Watson, H.J. "MIS Concepts (Decision Models)." Journal of System Management 26 (January 1975) pp. 34-37.
Here is an article on management information systems to facilitate decision making within an organization. It discusses problems which must be overcome before models can be used within an organization--decision support systems and the like.

I.C.4 Organizational Process and Mathematical Models.

Little, John. "Models and Managers: The Concept of a Decision Calculus." Management Science (April 1970) pp. B466-B485.
Little examines the relatively poor track record of management science applications to date. He asserts that the interface between modeler and manager is being neglected. Useful models that can bridge this gap must be simple, easy to control, adaptive, as complete as possible, and easy to communicate with. An example of such a model, drawn from marketing is presented.

Urban, Glenn L. "Building Models for Decision Makers." Interfaces 4 (May 1974) pp. 1-11.

A seven stage process for building formal models to support decision making is presented: 1) Formulation of priors. 2) Entry. 3) Problem finding. 4) Specification of model development criteria. 5) Model building. 6) Estimation and fitting. 7) Tracking. After all this follows continued use. The formal modeler must remain aware of these various processes which for the most part are grounded in principles of organizational decision making.

II. ORGANIZATIONAL DECISION MAKING

II.A. GENERAL WORKS ON THE ORGANIZATIONAL PERSPECTIVE

Allan, Harry T. "An Empirical Test of Choice and Decision Postulates in the Cyert and March Behavioral Theory of the Firm." Administrative Science Quarterly 11 (1966) pp. 405-413.

Allan presents an empirical corroboration of Cyert and March's Behavioral Theory of the Firm. This study, based upon the standard operating procedures surrounding the appeals process in the American legal system, suggests that the theory of Cyert and March may be more broadly applicable to organizations than to just firms.

Allison, Graham T. The Essence of Decision. (See Section V.C.; especially pay attention to his "Model II")

Carter, E. Eugene. "The Behavioral Theory of the Firm and Top Level Corporate Decisions." Administrative Science Quarterly 16 (1971) pp. 413-428. Top level corporate planning decisions are examined in the framework of Cyert and March's Behavioral Theory of the Firm. Based upon the study, extensions are suggested to the basic organizational theory of Cyert and March.

Cyert, Richard M. and March, James G. A Behavioral Theory of the Firm. 1963. (See Section II.E.)

March, James G. and Simon, Herbert A. Organizations. New York: Wiley and Sons, Inc., 1958, 262 pp.

In 1958, there was very little literature put together in a formal way that might be called a theory of formal organizations. March and Simon set out to fill that gap by creating this work--a theoretical treatise in the form of a set of interlinked propositions on organizations. Topics treated include motivation, conflict, cognitive limits to rationality, and planning and innovation. This work brought together much of the scattered work on formal organizations and opened the door for the establishment of a separate and distinct field for the study of organizations.

Meyer, Marshall W. "The Two Authority Structures of Bureaucratic Organization." Administrative Science Quarterly 13 (September 1968) pp. 211-228.

"Decision making authority is more highly centralized as the number of subunits in an organization increases; but as the number of levels of supervision grows, there is greater decentralization and at the same time proliferation of rules that specify criteria to guide decisions."

Mintzberg, Henry, Raisinghani, Duru and Theoret, Andre. "The Structure of 'Unstructured' Decision Processes." Administrative Science Quarterly 21 (June 1976) pp. 246-275.

Twenty-five decisions observed by graduate students are placed into a

coherent framework in an attempt to articulate a structure that appears to underlie this diverse set of seemingly unstructured decisions. Three principle phases are seen as composing the overall process--the identification, development, and selection phases. The identification phase contains the decision recognition and diagnosis stages. Development consists of search routines and design routines. Finally, the selection phase is composed of screening, evaluation, and authorization routines. The framework is a handy conceptual device for thinking about the organizational processes underlying decision making.

Rubenstein, Albert H. and Haberstroh, Chadwick J. Some Theories of Organization. 1966. (See Section V.A.)

Simon, Herbert A. Administrative Behavior: A Study of Decision Making Processes in Administrative Organizations. New York: Macmillan, 1965 (2d ed.), 259 pp. In this early work, Simon lays out, albeit in a broad brush and less precise fashion, the major foundations of the organizational model of decision making as it emerged at the Carnegie school in the 1950s and 1960s. This by now classic approach begins with an examination of a normatively rational model of choice (chapter IV), proceeds to show why individual human choice can not be objectively rational and demonstrates how organizational factors structure the decision-making situation for individuals and hence to a large degree pre-determine decision outcomes.

Simon, Herbert A. "On the Concept of Organizational Goal." Administrative Science Quarterly 9 (June 1964) pp. 1-22. Simon grapples with the elusive concept of an organizational goal. The following definition is proposed; a goal is composed of constraints or sets of constraints, imposed by the organizational role, that have only an indirect relation with the personal motives of the individual who fills the role necessary to act upon such goals. Furthermore, the organizational decision making mechanism is a loosely coupled, partially centralized structure in which different sets of constraints may impinge on decisions at different organizational locations.

Simon, Herbert A. The Science of the Artificial. 1969. (See Section I.B.)

II.B. ORGANIZATIONAL CRITIQUES OF AND EXTENSIONS TO RATIONALITY

Braybrooke, David and Lindblom, Charles E. A Strategy of Decision. 1970. (See Section V.B.)

Cyert, Richard M., Dill, W.R. and March, James G. "The Role of Expectations in Business Decision Making." Administrative Science Quarterly 3 (1958) pp. 307-340.

A critique is presented of the neo-classical economic theory of the firm approach to decision making. The neo-classical view posits that the

firm is a profit maximizer such that resources are allocated to a given purpose until expected marginal return equals expected marginal cost. The theory is critiqued for four reasons: 1) The classical theory assumes continuous competition among alternatives. 2) Search activity is viewed as simply another element competing for resources. 3) The neo-classical theories require excessive computational abilities on the part of decision makers. 4) Expectations are exogenously given. Four case studies, forming the bulk of the analysis, corroborate these criticisms.

Cyert, Richard M., Simon, Herbert A. and Trow, Donald B. "Observation of a Business Decision" in Rubenstein, Albert H. and Haberstroh, Chadwick J., eds. Some Theories of Organization. Homewood, Ill.: Dorsey, 1960, 492 pp.

A case study is presented wherein a medium sized manufacturing firm decides whether or not to acquire electronic data processing capabilities. The authors argue that the open-ended or unprogrammed decisions differ substantially from more well-defined programmed decisions. The classical theory of economic decision-making does not seem particularly valid for unprogrammed decisions. Specifically, rational economic theories of choice fail to account for 1) Search for alternative and information gathering processes that to a large degree determine which options are considered, or 2) Communication and information sharing processes within the organization. Preliminary definition of an alternative theory of decision making (to be elaborated in Behavioral Theory of the Firm) is outlined.

Lindblom, Charles E. "The Science of 'Muddling Through'." Public Administration Review 19 (spring 1959) pp. 79-88.

This essay begins with a critique of the rational-comprehensive (root) view of decision making. Instead of such a rational view, the essay argues that in an empirical sense decisions probably consist of successive limited comparisons between only a few options (branch view). An argument is made that the non-synoptic decision processes may do quite well toward (better than anyone might think) toward arriving at "best" decisions because limited comparisons can best deal with complex value and interest questions that seem to permeate public policy design.

March, James G. and Simon, Herbert A. "The Concept of Rationality" in Singer, Joel D., ed. Human Behavior and International Politics; Contributions from the Social-Psychological Sciences. Chicago: Rand McNally, 1965, 466 pp. First a brief sketch of the classical theory of rationality is laid out. Then some difficulties with that theory are presented--most notably that the alternatives and consequences considered are often conditioned by social and organizational factors. Finally the notions of routinized problem solving, problem-directed search, and satisficing vs. optimal decisions are introduced.

Simon, Herbert A. Administrative Behavior. 1965 (especially chapter 4). (See Section II.A.)

Simon, Herbert A. "A Behavioral Model of Rational Choice." 1957. (See Section I.B.)

Wildavsky, Aaron and Hammond, Arthur. "Comprehensive Versus Incremental Budgeting in the Department of Agriculture." Administrative Science Quarterly 10 (December 1965) pp. 321-346.

This is a thorough and interesting case study of the first application of "zero based" budgeting within the Department of Agriculture in 1962. Ultimately, most personnel resorted to incremental evaluation of alternatives finding global comparisons of all projects impossible. However, the whole exercise seemed useful because of many "unintended side-effects" on organizational behavior. Zero based budgeting did not work as intended because "comprehensive budgeting vastly overrates man's limited ability to calculate and grossly underestimates the importance of political and technological constraints." Summary conclusions concerning how to best manage innovations such as zero based budgeting are presented.

II.C. ORGANIZATIONAL ASPECTS OF POLITICAL DECISION MAKING

Allison, Graham T. and Halperin, Morton H. "Bureaucratic Politics: A Paradigm and Some Policy Implications." 1972. (See Section III.A.)

Braybrooke, David and Lindblom, Charles E. A Strategy of Decision. 1970. (See Section V.B.)

Crecine, John P. "A Computer Simulation for Municipal Budgeting." 1967. (See Section III.D.)

Crecine, John P. Governmental Problem Solving. 1969. (See Section III.D.)

Gerwin, D. "Towards a Theory of Public Decision Making." Administrative Science Quarterly 14 (March 1969) pp. 33-46.

This study is an empirical examination of the school budget-setting process. It relies heavily on the budget-simulation of Crecine--in turn derivative from Cyert and March's Behavioral Theory of the Firm--for much of its theoretical underpinnings. A key goal of the budget-setting organization is the reduction of conflict. Based upon the case study, a list of seven interesting generalities concerning the budget setting process is derived.

Lindblom, Charles E. The Intelligence of Democracy: Decision Making Through Mutual Adjustment. New York: The Free Press, 1965, 352 pp. The central theme within this work that caps much of Lindblom's earlier writing is the notion of mutual adjustment. Simply put, mutual adjustment means that "people can coordinate with each other without anyone's coordinating them, without a dominant central purpose." The notion of mutual adjustment is the backbone of an economy of markets and also forms the basis for the evolution of common case law. Lindblom argues that public policy also results from mutual accommodation between partisan

actors. The argument is made that mutual accommodation, rather than "clogging up" the works of a centralized policy process, is perhaps one of the dominant forces leading to workable policy formation. Considerable attention is given to a comparison of central coordination and mutual accommodation as policy processes.

Lindblom, Charles E. "The Science of Muddling Through." 1959. (See Section II.B.)

Pettigrew, Andrew M. The Politics of Organizational Decision Theory.

London: Tavistock, 1973, 302 pp.

The second chapter of this volume focuses on "Decision Making as a Political Process". Subheadings under this discussion include, the organization as a political system, power and organizational decision making, and theoretical bearings. The overall thrust of the essay argues that "within decision making processes, power strategies are employed by the various interested parties through their demands... The final decision outcome will evolve out of the processes of power mobilization attempted by each party in support of its demands."

Schick, A. "A Death in the Bureaucracy: The Demise of Federal PPB." Public Administration Review 33 (March-April 1973) pp. 146-156.

This is a recount of the political story surrounding the death of program planning and budgeting in the federal government in 1971. The PPB advocates failed to win a way into the routine budgeting procedures of the federal government because its advocates were not sensitive to the established political and organizational routines--another blow is struck against rationality in favor of incrementalism. Political and organizational factors are cited as the cause of the death of PPB.

Steinbruner, John D. The Cybernetic Theory of the Firm. 1974. (See Section V.C.)

Ugalde, Antonio. "A Decision Model for Study of Public Bureaucracies." Policy Sciences 4 (1973) pp. 75-84.

The "series of decision" concept is defined. That is, a decision is really a string of decisions--usually of two types--programming and implementation decisions. A case study from the health ministry of Colombia is presented.

Wildavsky, Aaron and Hammond Arthur. "Comprehensive Versus Incremental Budgeting in the Department of Agriculture." 1965. (See Section II.B.)

Wohlstetter, Roberta. Pearl Harbor: Warning and Decision. Stanford, Calif.: Stanford University Press, 1962, 426 pp.

This is a detailed empirical analysis of the communication, warning, and other organizational policy systems that left the United States totally surprised after the Pearl Harbor attack.

II.D. PSYCHOLOGICAL-ORGANIZATIONAL PERSPECTIVE (See Section IV.D. Psychological-Organizational Perspective)

II.E. MATHEMATICAL MODELS OF ORGANIZATIONAL DECISION MAKING

- Allan, Harry T. "An Empirical Test of Choice and Decision Postulates in the Cyert and March Behavioral Theory of the Firm." 1966. (See Section II.A.)
- Benton, John. Managing the Organizational Decision Process. 1973. (See Section I.C., portion on "the systems approach".)
- Cyert, Richard M. and March, James G. A Behavioral Theory of the Firm. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963, 332 pp.
This seminal work presents an alternative to the neo-classical economic theory of the firm. It pulls together many of the critiques of rational decision making and insights into organizational processes that had been generated in the late 1950s and early 1960s at the Carnegie School of Industrial Administration. In this work, a computer simulation model of the processes underlying organizational choice is constructed. Organizations are seen as consisting of multiple subunits each of which pursues a parochial set of goals and interests. Each subunit does not strive for optimal strategies, instead it seeks to attain satisfactory strategies that meet the constraints imposed by the environment. The theory is empirically verified by a computer simulation of retailing in a large chain store.
- Cyert, Richard M., March, James G. and Feigenbaum, Edward A. "Models in a Behavioral Theory of the Firm." Behavioral Science 4 (1959) pp. 81-95.
This article is a precursor to the more general Behavioral Theory of the Firm. It lays out a computer simulation of a duopoly market based upon a behavioral theory of decision making. Model output is validated against actual industry data. This is an early landmark in the organizational school of decision making. It plugs a hole (that is duopoly theory) that had existed in the more rational economic theory of the firm.
- Forrester, Jay W. "Industrial Dynamics--A Major Breakthrough for Decision Makers." 1958. (See Section I.C.)
- Little, John. "Models and Managers: The Concept of a Decision Calculus." (See Section I.C., portion on organizational processes and mathematical models).
- Simon, Herbert A. Models of Man. 1957. (See Section V.A.)
- Urban, Glenn L. "Building Models for Decision Makers." 1974. (See Section I.C., portion on organizational processes and mathematical models.)

III. POLITICAL DECISION MAKING

III.A. GENERAL WORKS ON THE POLITICAL PERSPECTIVE

Allison, Graham T. The Essence of Decision. 1971. (See Section V.C.)

Allison, Graham T. and Halperin, Morton H. "Bureaucratic Politics: A Paradigm and Some Policy Implications." World Politics 24 (Supplement 1972) pp. 40-79.

This article elaborates Allison's Bureaucratic Politics model to include bureaucracies as actors in the political "game." This model represents a blending and enrichment of Allison's MODEL II (organizational) and MODEL III (bureaucratic politics). The result is a rich theory of international relations. Numerous examples are drawn from recent U.S. defense cases. Specific prescription in the form of precepts is given for U.S. policy planners.

Frankel, Joseph. The Making of Foreign Policy: An Analysis of Decision Making. London: Oxford University Press, 1963, 231 pp.

This is a theoretical treatise outlining foreign policy making as a process of decision making. The author contrasts this "theoretical" approach to a more historical or descriptive approach. Separate topics impacting upon the decision making process such as international environment, domestic environment, information, values, the organization of values, and choice are treated in more detail.

Gore, William J. Administrative Decision Making: A Heuristic Model. New York: John Wiley and Sons, Inc., 1964, 191 pp.

Gore begins by noting the importance of decision making for understanding organizational output. He argues that the available images of "rational systems" are inadequate explanations of real decision processes. He proceeds to erect an alternative model of decision making that evokes an organismic image of an organization caught in a never ending attempt to reach equilibrium with its operating environment. The metaphor of "tension web" is used to describe a prime motivator of organizational actions.

Lindblom, Charles E. The Policy-Making Process. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1968, 122 pp.

Here Lindblom explores the fundamental question of what is the "underlying process by which policy is made?" He views policy making as an extremely complex and messy political bartering process. The role of analysis in the policy process is brought into a severe questioning light. This is an interesting exploratory essay that appears to open up many more questions than it answers.

Rosenau, James N. "The Premises and Promises of Decision-Making Analysis" in Charlesworth, James C., ed. Contemporary Political Analysis. New York: The Free Press, 1967, pp. 189-211.

Rosenau traces the history of the introduction of "decision making" as a primary organizing concept in the political science literature. Beginning with Snyder's work in 1954, he traces a host of empirical studies that borrow from the decision making concepts but do not explicitly use specific properties of Snyder. He concludes that the decision making approach as originally formulated is conceptually rich but lacking in a detailed field of empirically testable hypotheses.

Snyder, Richard C., Bruck, H.W. and Sapin, Burton, eds. Foreign Policy Decision-Making: An Approach to the Study of International Politics. New York: The Free Press at Glencoe, 1962, 274 pp.

This volume is a reprint and expansion of the author's earlier monograph, Decision-Making as an Approach to the Study of International Politics. The original work proposes that the fields of psychology (individual cognitive and personality factors) and sociology (organizational factors) be applied to the study of international politics. The approach was novel and seminal in its generation of insight. However, the work suffers because many of the frames and categories presented have not been fully integrated. This volume also presents criticisms of and further empirical work based upon the earlier monograph.

Snyder, Richard C. and Paige, Glenn D. "The United States Decision to Resist Aggression in Korea: The Application of an Analytical Scheme." Administrative Science Quarterly 3 (December 1968) pp. 341-378.

A case study of the U.S. decision to resist aggression in Korea is presented. This empirical study is based upon an amalgamated theory of decision making. The essential theme emphasizes the interplay between organizational and individual "intellectual" factors. The behavior of foreign policy makers is controlled by four sets of factors: 1) organizational-individual factors, 2) internal (domestic) settings, 3) external setting and 4) properties of the individual situation under question. The study concludes that the U.S. did decide to resist Korean aggression with military force.

Sorensen, Theodore C. Decision-Making in the White House: The Olive Branch or the Arrows. New York: Columbia University Press, 1963, 94 pp.

This work presents the thesis that the president's decisions are shaped by the nature of his office. There is a discussion of various factors, political, economic, etc. which influence presidential decision making. Stress is placed upon the concept that the decisions of the president affect an enormous number of people--a factor which necessarily colors the decision making process in the White House.

Steinbruner, John D. The Essence of Decision. 1971. (See Section V.C.)

III.B. ORGANIZATIONAL ASPECTS OF POLITICAL DECISION MAKING (See Section II.C. Organizational Aspects of Political Decision Making)

III.C. PSYCHOLOGICAL ASPECTS OF POLITICAL DECISION MAKING (See Section IV.C. Psychological Aspects of Political Decision Making)

III.D. MATHEMATICAL MODELS OF POLITICAL DECISION MAKING

Axelrod, Robert M. A Framework for a General Theory of Cognition and Choice. 1972. (See Section IV.E.)

Axelrod, Robert M. The Structure of Decision. 1976. (See Section IV.C.)

Crecine, John P. "A Computer Simulation Model for Municipal Budgeting." Management Science 13 (July 1967) pp. 786-815.

The article presents a "positive" empirical theory of municipal budgeting. Based upon the Carnegie school's developing theory of decision making as organizational process, a computer simulation of the municipal budgeting process is developed. This article is a condensation of Crecine's longer work, A Computer Simulation of Municipal Budgeting.

Crecine, John P. Governmental Problem Solving: A Computer Simulation of Municipal Budgeting. Chicago: Rand McNally and Co., 1969, 338 pp.

After extensive interviewing in Cleveland, Pittsburgh, and Detroit, an explicit theory of how the municipal budget setting process occurs is posited. The theory focuses on the internal organizational behavior of the various sub-units involved in the decision making process. The formal theory is codified into a formal computer simulation. Model output is compared to actual decisions as a test of model validity. This study is a classic in the theory of municipal budgeting.

IV. PSYCHOLOGICAL DECISION MAKING

IV.A. GENERAL WORKS ON THE PSYCHOLOGICAL PERSPECTIVE

Alutto, Joseph A. and Belasco, James A. "A Typology for Participation in Organized Decision Making." Administrative Science Quarterly 17 (March 1972) pp. 117-125.

In a study conducted in two separate school districts among 454 faculty members there was found the "universal desirability of increased participation in decision making." The study concludes that there is a relationship between the number of decisions an individual wishes to participate in and the number that he actually does participate in.

Axelrod, Robert M. "Schemata Theory: An Information Processing Model of Perception and Cognition." The American Political Science Review 67 (December 1973)

The article states that the source of a message is important for its credence. It shows a flowchart by which a message gets sifted from one areas to another, i.e. into a schema. If the interpretation of where the evidence, the information, belongs is wrong, then, through satisficing, a new schema is found. If the original schema was successful, the information becomes more "grooved" into it.

Brim, Orville, Glass, David C., Lavin, David E. and Goodman, Norman. Personality and Decision Processes. Stanford: Stanford University Press, 1962, 336 pp.

Data is collected in the form of a questionnaire from 200 parents in a decision making simulation concerning decisions around child rearing. The data is coded to demonstrate how parents performed on each of ten dimensions that characterized "rational" decision making. This data is correlated with multiple measures of parents' personalities and background in an attempt to determine how personality variables contribute to the decision making process.

Miller, G. "The Magic Number 7 ± 2 : Some Limits on Our Capacity for Processing Information." The Psychology of Communication (1967) pp. 14-44.

Miller whimsically considers many of the fundamental limitations of the human mind in terms of our ability to process information. Based upon a multitude of empirical studies he observes that short term memory and other information processing functions of the mind seem to be limited to seven (plus or minus two) separate "chunks." The notion of limits to human cognitive ability is a central theme in cognitively based models of human decision processes. He presents a fine review of much of the literature as applied to cognitive decision making.

Thordarson, Bruce. Trudeau and Foreign Policy. 1972. (See Section IV.C)

IV.B. PSYCHOLOGICAL CRITIQUES OF AND EXTENSIONS TO RATIONALITY

Miller, G. "The Magic Number 7 ± 2 : Some Limits on Our Capacity for Processing Information." 1976. (See Section IV.A.)

Siegel, Sidney. "Level of Aspiration and Decision Making." Psychological Review 64 (July 1957) pp. 253-262.

Siegel argues that the results of behavioral psychology should be integrated into formal mathematical descriptions of decision making. Specifically the notion of level of aspiration of the subject and reinforcement attained from reaching a level higher or lower than the level of aspiration should be incorporated into the utility functions of individual decision makers.

Slovic, Paul. "Limitations of the Mind of Man: Implications for Decision Making in the Nuclear Age." Oregon Research Institute Research Bulletin 2 (1971)

Slovic discusses decision making as it pertains to nuclear events, mentioning such items as biased judgements of probabilistic events, correlation and cause, probabilistic judgements and quantifying uncertainty. A final point: with nuclear energy perhaps we can not rely on a trial and error approach to decision making.

Wendt, Dirk. "Some Criticism of Stochastic Models Generally Used in Decision Making Experiments." 1975. (See Section I.B.)

IV.C. PSYCHOLOGICAL ASPECTS OF POLITICAL DECISION MAKING

Axelrod, Robert M. "Argumentation in Foreign Policy Decision-Making: Britain in 1918, Munich in 1938 and Japan in 1970." Institute of Public Policy Studies Discussion Paper, # 90, the University of Michigan, 1976.

Axelrod completes a causal analysis of the transcripts for all three cases, looking at the role of argumentation in each case, as it pertained to the decision making at the time.

Axelrod, Robert M., ed. The Structure of Decision: The Cognitive Maps of Political Elites. Princeton, N.J.: Princeton University Press, 1976, 404 pp.

In this collection of essays a set of empirical techniques for determining the cognitive maps of political elites, that is, how political leaders tend to causally think about the world, are presented. Several empirical studies are also presented wherein the cognitive maps of key decision makers or groups of decision makers have been assessed and analyzed. The theory underlying this approach is that by better understanding the causal maps actually employed by decision elites and by promoting their explicit articulation, better decisions can result. Several essays present mathematical techniques for analyzing the strategic consequences of the empirically derived cognitive, causal maps.

Bonham, G.M., Shapiro, M.J. and Nozicka, G.J. "Cognitive Process Model of Foreign Policy Decision Making." Simulation and Games 7 (1976) pp. 123-152.

The authors set about to show that rational decision making can not possibly take into account the fallible nature of man in making decisions. Over five years they worked to develop a "cognitive process" model of policy decision making which would reflect man's ability to make irrational choices.

Holsti, Ole R. "Crisis, Stress and Decision Making." International Social Science Journal 23 (1971) pp. 53-67.

Holsti completes a review of the experimental psychological literature on human reactions to crisis situations. From these research findings he attempts to extrapolate what effects crises situations will have on political decision makers. He concludes that crisis induced differences in decision making abilities "are likely to inhibit rather than facilitate the performance of those engaged in the complex tasks of making foreign-policy decisions."

Holsti, Ole R. "The 'Operational Code' Approach to the Study of Political Leaders: John Foster Dulles' Philosophical and Instrumental Beliefs." Canadian Journal of Political Science 3 (March 1970) pp. 123-157

Holsti studied Dulles' writings to assess his operational code. He establishes five philosophical and five "instrumental" questions or beliefs that Dulles considered when in a decision making situation.

Jervis, Robert. Perception and Misperception in International Politics. Princeton, N.J.: Princeton University Press, 1976.

Jervis reviews the bodies of psychological literature on perception that appear to be relevant to understanding decision making processes in international politics. The emphasis is upon a detailed psychological description of the perceptual biases that intelligent concerned statesmen may tend to make in the face of highly uncertain and ambiguous decision making environments. The conclusions argue that to as large a degree as possible, decisions due to implicit perceptual biases should be replaced by explicit and more reasoned judgements. Several techniques for attaining this end are presented. The volume presents a good review of the psychological literature of decision making.

Steinbruner, John D. The Cybernetic Theory of the Firm. 1974. (See Section V.C.)

Thordarson, Bruce. Trudeau and Foreign Policy: A Study of Decision Making. Toronto: Oxford University Press, 1972, 231 pp.

This work completes an exhaustive analysis of the political philosophy of Pierre Trudeau as one of the major elements contributing to Canada's reexamination of its foreign policy (resulting in a shift toward "isolationism") between 1968 and 1970. The psychological factors specific to Trudeau are weighted against a series of environmental factors associated with 1) Canada's decision to review foreign policy in 1968 and 2) Canada's reduction in its commitment to NATO in 1969.

IV.D. PSYCHOLOGICAL-ORGANIZATIONAL PERSPECTIVES

Axelrod, Robert M. "Schemata Theory: An Information Processing Model of Perception and Cognition." 1973. (See Section IV.A.)

Cyert, Richard M., Dill, W.R. and March, James G. "The Role of Expectations in Business Decision Making." 1958. (See Section II.B.)

Cyert, Richard M., Simon, Herbert A., and Trow, Donald B. "Observations of a Business Decision." 1960. (See Section II.B.)

Simon, Herbert A. "A Behavioral Model of Rational Choice." 1957. (See Section I.B.)

Simon, Herbert A. The New Science of Management Decision. 1960. (See Section V.B.)

IV.E. MATHEMATICAL MODELS OF PSYCHOLOGICAL DECISION MAKING

Axelrod, Robert M. A Framework for a General Theory of Cognition and Choice. Berkeley: Institute of International Studies. 1972, 35 pp.

From the introduction: "This paper presents an outline of a general theory of cognition and choice. The purpose of the general theory is to encompass as many different social sciences literatures as possible in a single mathematical model. The theme of the paper is that many of the same aspects of cognition and choice problems have been studied under different labels in different literatures and these various studies can be related to each other in the context of a mathematical model."

Axelrod, Robert M. The Structure of Decision. 1976. (See Section IV.C.)

Feigenbaum, Edward A. and Feldman, Julian, eds. Computers and Thought, A Collection of Articles by Armer [and others] New York: McGraw-Hill Book Company, Inc., 1963, 535 pp.

This collection of eighteen articles aptly summarizes the field of artificial intelligence--a field dedicated to the premise that significant aspects of human cognitive processes can be reduced to well-ordered computer programs and studied via simulation. Although computers have made remarkable progress in such tasks as completing algebraic proofs and playing chess, there is little empirical evidence that clearly demonstrates the applicability of artificial intelligence to organizational decision making processes. The collection is included for its theoretical richness and promise rather than for actual empirical results in the field of organizational decision making.

Simon, Herbert A. Models of Man. 1957. (See Section V.A.)

Simon, Herbert A. The New Science of Management Decision. 1960.
(See Section V.B.)

Taylor, Michael. "The Problem of Saliency in the Theory of Collective
Decision Making." 1970. (See Section I.C.2)

V. CROSS PERSPECTIVE VIEWS

V.A. READERS

Alexis, Marcus and Wilson, Charles Z., eds. Organizational Decision Making. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967, 447 pp. Very broad in scope, this reader talks about behavioral, rational, and organizational views in its various sections. Articles by Cyert and Simon should be noted. There is also a section on quantitative models and the theory of games.

Feigenbaum, Edward A. and Feldman, Julian, eds. Computers and Thought. 1963. (See Section IV.E.)

Gore, William J. and Dyson J.W, eds. The Making of Decisions: A Reader in Administrative Behavior. New York: The Free Press at Glencoe, 1964, 440 pp.

An introduction to decision making strategies, the twenty four articles by major thinkers in the field of decision making (March, Cyert, Simon, Lindblom, etc.) survey various perspectives of the field.

Rappaport, Alfred. Information for Decision Making: Quantitative and Behavioral Dimensions. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1970, 447 pp.

A general reader, the text starts with an article on rational theory and moves to models, both computer and heuristic, the structure of managerial decision theory and the use of information systems.

Rubenstein, Albert H. and Haberstroh, Chadwick J. Some Theories of Organization. Homewood, Ill.: The Dorsey Press, 1966, 722 pp. The seventh section of this reader on organizational theory is devoted to decision making. The editors of the work envision the field to be divided in two camps. First there are descriptions of behavior versus normative behavioral perceptions. Secondly, the field may be divided into analysis of 1) the decision, 2) the decision maker, and 3) the decision process. Seven individual essays are presented ranging from role theory and small group behavior to an analysis of decision in large bureaucratic organizations.

Simon, Herbert A. Models of Man: Social and Rational, Mathematical Essays on Rational Human Behavior in a Social Setting. New York: John Wiley and Sons, Inc., 1957, 287 pp.

Simon collects sixteen previously published essays in an attempt to "lay foundation for a science of man that will accommodate comfortably his dual nature as a social and as a rational man." These mathematical essays portray both a critique and an extension of a classical image of man as a decision maker. Topics include 1)

causation and influence relations, 2) social processes, 3) motivation inducements and contributions and 4) rationality and administrative decision making.

Weber, Charles E. and Peters, Gerald. Management Action: Models of Administrative Decisions. Scranton, Pa.: International Textbook Company, 1969, 324 pp.

This reader basically sets up alternatives in a modeling situation for a variety of areas, sales, public health and libraries among them. It includes a chapter on models of decision behavior for librarians.

V.B. OVERVIEW ARTICLES, MONOGRAPHS, AND TEXTS

Braybrooke, David and Lindblom, Charles E. A Strategy of Decision: Policy Evaluation as a Social Process. New York: The Free Press, 1970, 268 pp.

Braybrooke and Lindblom present an alternative to synoptic rationalism. Decisions are not made by a single actor who finds all the alternatives and selects the best from among them. Instead individual decision makers complete limited comparisons between given alternatives, the given alternatives often being quite close to the current set of affairs. The argument is made that this disjoint and incremental approach to decision making (as opposed to synoptically rational) is 1) the method currently practiced in most public bureaucracies, and 2) tends to blend the complexly intertwined values and interests of multiple interest groups much better than a rational process ever could. An excellent monograph.

Ebert, Ronald J. and Mitchell, Terence R. Organizational Decision Processes: Concepts and Analysis. New York: Crane, Russak, 1975, 331 pp.

A readable introduction to the field of decision making displaying much of the diversity of the field (perhaps as a text for a course). However, the stated aim of presenting an "integrated whole" is met more by a unified writing style emphasizing some points of tangency rather than by a genuine unification of the multiple perspectives. A view that starts with the individual's cognitive processes and works out to include organizational and environmental variables is presented. Special topics such as information processes, beliefs and values, formal models, group processes, and organizational power are presented in separate chapters.

Gore, William J. and Silander, Fred S. "A Bibliographic Essay on Decision-Making." Administrative Science Quarterly 4 (1959) pp. 97-121.

Gore sees decision making as a fractured and conceptually incomplete body of literature. However, he pursues two central threads in his analysis, the behavioristic or organismic and the rationalistic.

The (at the time) emerging work at Carnegie Mellon under Simon is viewed as half way between these two threads verging more toward rationalistic. Within the organismic approach Gore traces three threads, the web of organizational relations connecting the deciding group to its environment, the organizational context and structure of the decision making process, and finally, behavioral descriptions of the decision making process itself. The rational approach is a normative attempt to reduce non-rationality and irrationality through management science techniques such as game theory, statistical decision theory, and linear programming. This final section is quite dated.

Radford, K.J. Managerial Decision Making. Reston, Va.: Reston Publishing Company, Inc., 1975, 240 pp.

Written as a possible text for senior undergraduates or graduate business, commerce or management science students, this work uses a combination of approaches to decision making, namely quantitative plus humanistic and organizational behavior. In its combined approach it also discusses game theory and group behavior.

Shubik, Martin. "Approaches to the Study of Decision Making Relevant to the Firm." Journal of Business 34 (April 1961) pp. 101-118.

This essay begins with a critique of the classical "economic man" as the core of the theory of the firm. A taxonomy of emerging alternative approaches to the theory of the firm is presented. No attempt is made to give an exhaustive treatment of each of the alternatives sketched. "The traditional areas of economics, psychology, mathematics, and statistics, to name a few, have not provided adequate theories to explain many problems of decision making in a complex and uncertain environment.... The work discussed here is beginning to replace [economic man] with a less pure, more complex and flexible individual whose problems and behavior are closer to those we find in the world around us."

Shubik, Martin. "Studies and Theories of Decision Making." Administrative Science Quarterly 3 (December 1958) pp. 289-306.

An overview to various theories of decision making is presented. The bulk of the work concentrates on 1) economic man, 2) a theory of the firm, 3) a discussion of simulation approaches to economic man and 4) the building of an economic model. This emphasis reflects the author's training in economics. Other sections allude to the fact that processes (such as psychological and small group ones) also contribute to the decision making process.

Simon, Herbert A. The New Science of Management Decision. New York: Harper and Row, Publishers, 1960, 50 pp.

These five essays are adapted from a series of three lectures given at NYU in 1960. In these essays Simon points to a picture concerning the future of the "new science" of management. Routine or programmed decision making will be replaced by operations research type methods and unprogrammed decisions will be significantly aided by heuristic problem solving techniques. An intuitive introduction to heuristic problem solving is given. Finally, a sketch of a new

focus of "man-machine systems for decision making" is presented. Although these projections now seem overly optimistic, they do provide an interesting perspective on where leaders of the management science field saw themselves going in the early 1960s.

Simon, Herbert A. The Sciences of the Artificial. Cambridge, Mass.: M.I.T. Press, 1969, 123 pp.

This volume presents four linked essays, originally presented in 1968 as part of the Karl Taylor Compton lecture series at M.I.T. In a reflection over nearly thirty years of seminal work, Simon makes a rather obvious distinction between "natural" and "artificial" systems--an artificial "system being modeled, by goals or purposes, to the environment in which it lies." Artificial systems comprise the man-made world--they have been designed and are maintained by human ingenuity. The science of design--the science of the artificial--is common to engineering, law, medicine, business; in a word all practitioners who design the artifacts of our culture. In these stimulating essays Simon asks whether or not there are general principles of design for artificial systems that can serve as the basis for a new science of the artificial.

Snyder, Richard C., Bruck, H.W. and Sapin, Burton. Foreign Policy Decision Making. 1962. (See Section III.A.)

V.C. ANALYSES EXPLICITLY BASED ON MULTIPLE PERSPECTIVES

Allison, Graham T. "Conceptual Models and the Cuban Missile Crisis." American Political Science Review 63 (September 1969) pp. 689-718. This is the early work leading to Allison's Essence of Decision.

Allison, Graham T. The Essence of Decision: Explaining the Cuban Missile Crisis. Boston: Little, Brown and Company, 1971, 338 pp. Three distinct models: the rational, organizational and bureaucratic political are derived and their fundamental assumptions exposed. Then each of the three views of decision making is used to explain the decision making processes, both Russian and American, surrounding the Cuban missile crisis. Close attention is paid to how the analyst by switching his analytic frame of reference can arrive at quantitatively different interpretations of the decision making process. This was a pioneering piece of work, advocating that analysts would do well to view decision making process as a multiple perspective affair.

Hesse, Rick and Altman, Steve. "Star Trek: Optimum Decision Making Model." Interfaces 6 (May 1976) pp. 60-62. Spock's cool and unemotional assessments of even the most tense moments are exactly what rational, "operation research" analysts aspire to. But often Captain Kirk ignores Spock's analytic view of the situation in favor of Doctor McCoy's more human and intuitive assessment of the situation. Of course, Captain Kirk always makes the best--the "optimum"--

decision. The magic of the Star Trek model lies in its uncanny ability to blend the cool and analytic with the warm and affective side of decision making. How do they do it? How could we do it?

Steinbruner, John D. The Cybernetic Theory of Decision: New Dimensions of Political Analysis. Princeton, N.J.: Princeton University Press, 1974, 366 pp.

Three perspectives on the decision making process are presented in the first half of the book--a form of rational, organizational, and psychological. The organizational perspective draws heavily on the work of Cyert and March and views political organizations as cybernetic mechanisms that use a small number of standardized routines and operating procedures to match organizational goals with the constraints put upon the organization by its environment. The psychological portions of the model draw heavily upon cognitive psychology, picturing human decision makers as information processors with only limited abilities to delineate all alternatives and to integrate complex and sometimes contradictory values and goals. In the second half of the book the perspectives delineated in the first half are applied to the case of strategic arms negotiations in Europe.

Steinbruner, John D. "Some Effects of Decision Procedures on Policy Outcomes: A Series of Experiments Using Policy Games." Cambridge, Mass.: M.I.T. Center for International Studies, 1970, 151 pp.

In his earlier work Steinbruner has articulated a "cybernetic theory of decision." In this work he sets out to test the hypothesis that "individuals who utilize a process fitting the rational paradigm [will] make different decisions than individuals utilizing a process fitting the cybernetic paradigm." A gaming situation is devised for testing this central hypothesis. The findings of the game were subject to rather severe validity constraints but could still be seen as useful. "Any serious research program using PME (games) as a research device should integrate it with the other levels of analysis and the other methods and data bases which they imply."

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